

## **CHAPTER 3. ENVIRONMENTAL SETTING OF THE PROPOSED PROJECT**

This chapter is intended to provide the current environmental setting of the proposed project. Initially, information regarding wild turkey biology and ecology is presented to provide a background for some analyses of the proposed project, followed by a historical perspective of wild turkeys in California. Finally, the habitat conditions and sensitive flora and fauna potentially present at the release sites are presented. This information provides a background for the analysis of potential impacts to the environment presented in Chapter 4.

### **WILD TURKEY NATURAL HISTORY, BIOLOGY, AND HABITAT RELATIONSHIPS**

#### **Natural History and Distribution**

The wild turkey belongs to the order Galliformes (ground-nesting fowl), family Phasianidae (pheasants and turkeys), subfamily Meleagridae (Stangel et. al., 1992, Rea 1980, Steadman 1980). There are two species in the genus *Meleagris* sp., the wild turkey (*M. gallopavo*) and the ocellated turkey (*M. ocellata*), which does not inhabit the United States. The wild turkey is native only to North America and occurs widely in the United States and northern Mexico (Fig. 3.1).

The wild turkey species (*M. gallopavo*) has been split into six recognized subspecies distinguished by geography, habitat, morphology, and plumage. The eastern subspecies (*M. g. silvestris*), is the most widespread and best studied subspecies. It ranges in deciduous forests primarily east of the Mississippi River, but it also extends to Missouri and the Dakotas (Lewis 1973). The smallest subspecies is the Florida turkey (*M. g. osceola*), which is found only in Florida. The Gould's turkey (*M. g. mexicana*) is the largest in size of the subspecies and is found predominantly in Mexico, but small populations exist in Arizona and New Mexico (Lewis 1973), with efforts

currently underway to reintroduce extirpated populations in these areas. The Rio Grande turkey (*M. g. intermedia*) is a native of the arid region of the Rio Grande, ranging from southern Kansas through Texas to New Mexico and Mexico. This subspecies has also been introduced successfully throughout the western United States. The fifth existing subspecies is the Merriam's turkey (*M. g. merriami*), which is native to the semi-arid southwestern United States, including South Dakota, Colorado, New Mexico and Arizona. This subspecies has also expanded its range throughout the western United States by introductions into central-northern Nebraska, western South Dakota, southwestern North Dakota, Wyoming, Montana, Idaho, Nevada, Washington, Oregon, and California (Lewis 1973). The Mexican turkey (*M. g. gallopavo*) is the sixth subspecies that once inhabited the region of southern Mexico. Domestic turkeys probably originated from this subspecies, which is now considered extinct (Pelham et al. 1992).

Besides geographic locations, turkey subspecies can be distinguished morphologically by comparative measurements of external characters and feather color patterns. The eastern and Florida subspecies have tail feather tips colored chestnut or light chocolate brown whereas the western subspecies have whiter tips. Also, the rump feathers of the eastern races are brown and tipped with brown or buff, but Merriam's, Rio Grande, and Gould's turkeys have white rump feathers (Lewis 1973).

## **General Biology**

The wild turkey is a highly social flocking bird that maintains a hierarchy or pecking order. They form large flocks in the winter and disperse into sexually segregated flocks in spring and summer. Turkeys are polygamous and breeding behavior begins in late winter as daylight increases. Toms or gobblers (males) call (gobble) and display for hens (females), who chose their mates. Turkeys are ground nesting birds. Hens become solitary as they begin nesting, laying about one egg per

day until a clutch of about 10-12 eggs is laid. During laying hens generally spend less than one hour per day on the nest, foraging much of the rest of the time. They begin continuous incubation, which lasts 25-29 days when the entire clutch is laid. They often leave the nest for brief periods to feed during this time. Turkey poults (chicks) are hatched precocial (fully developed) and imprint immediately to the hen, from which they learn all behaviors. Poults leave the nest with the hen within two days following hatching to forage and develop. Within about two weeks, poults can fly and begin roosting in trees with the hen. They grow to adult size within 12-16 weeks and are sexually mature in their first year, although young hens do not always nest (Healy 1992).

## **Habitat Requirements**

Throughout the wild turkey's range, a suitable habitat contains a combination of two key components: trees and open grasslands. Trees provide food, escape cover, and most important, nighttime roost sites, where they can avoid predators and adverse weather conditions. Besides roosting, the wild turkey is largely a ground dwelling and feeding bird. Open grasslands are the other key component to suitable wild turkey habitats, providing food for adults, insect production for poults, and open areas where turkeys can efficiently forage while avoiding predation. Ultimately, moisture sufficient to produce suitable habitat conditions seems key in determining the range of wild turkeys by producing suitable habitat conditions, but moisture also limits turkey range. The wild turkey is not adapted well for marsh environments or persistent deep snow that exceeds 25 cm (10 inches; Porter 1992).

The ratio of forested and open grasslands varies throughout wild turkey range, from as little as 15% to as high as 90% forested habitat. However, the quality and interspersions of these habitats are probably most important. The annual home range of wild turkeys varies from 150 to 550 hectares (Brown 1980) and contains a mixture of

roosting habitat, nesting habitat, brood-rearing habitat, and fall and winter habitats. Turkeys often roost in the largest trees within a stand that provide easiest access (Rumble 1992), but also presumably to see their surrounding environment well. Physiographic characteristics of slope, aspect, and distance to water and clearings are also important for roost site selection (Porter 1992).

The characteristic most associated with nest site selection is lateral cover, which obscures detection by predators. Lateral cover is most commonly provided by shrubs, herbaceous vegetation and woody debris. An overhead canopy provided by shrubs and trees is also associated with successful nest sites. Proper conditions for nesting are best produced in woodlands. However, forest openings with herbaceous vegetation (grasses and forbs) are particularly important during brood rearing. These openings provide areas where poults can easily move around and frequently forage, while remaining concealed from predators. Nest sites that are in close proximity to good brood rearing habitats typically results in higher chick survival, further demonstrating the importance of well interspersed forested and open areas within suitable turkey habitat (Porter 1992).

The five subspecies of wild turkey occupy a range of habitat conditions, from eastern oak-hickory forest to mesquite-brush land of Texas, and they have also been successfully introduced to all of the western states and Hawaii, demonstrating the species' ability to adapt well to different environments.

## **Foraging Ecology and Food Habits**

Numerous studies have been conducted on wild turkey foraging ecology and food habits throughout their range, using crop and stomach contents and analysis of fecal material. The following discussion is intended to provide a brief review of the food habits and foraging ecology of wild turkeys highlighting those aspects that apply most to

the analysis of potential impacts to the environment presented in this document. Comprehensive reviews of wild turkey feeding ecology may be found in Hurst (1992), Korshgen (1967), and Schorger (1966). Appendix D contains a review of the wild turkey food habits literature used in this document.

### Digestive System Physiology

Wild turkeys are omnivores that can consume a wide variety of plant and animal foods (Schorger 1966, Hurst 1992). Like other gallinaceous birds, wild turkeys have among the longest intestines and ceca of all birds, capable of extracting nutrition from numerous food sources, including coarse vegetation low in nutritional value (Schorger 1966, Blankenship 1992). Nutritional requirements of wild turkeys vary with age and by season, with a combination of acceptable foods needed to satisfy nutritional requirements (Beck and Beck 1955). Wild turkeys ingest food items through the esophagus and store them temporarily in their crop, which is an expandable organ reported to contain about 178 cubic centimeters on average when full (Schemnitz 1956, Mosby and Handley 1943). Food items then pass into the gizzard, which is a powerful organ that grinds foods for digestion, capable of crushing very hard items, including large seeds and fibrous vegetation that is usually well fragmented when excreted in fecal material. However, smaller hard seeds may sometimes pass through the digestive system in tact (Schorger 1966, Blankenship 1992).

### Preferred Foods

Wild turkeys are reported as opportunistic omnivores in the scientific literature (Hurst 1992). The crop and stomach contents of 524 wild turkeys in Virginia contained 354 different plant species (representing 80 families) and 313 different invertebrate species (Dalke et al. 1942, Mosby and Handley 1943). As part of their generalist feeding behavior, wild turkeys are consistently reported to forage from acceptable food

items most available in their environment seasonally (Garver 1987, Hurst 1992). When examining any turkey food habits studies, the majority of the diet at any particular time is comprised of a few food items widely available in the environment at the time, accompanied by many incidental food items that are much less frequently consumed. Appendix D contains several summary tables from studies of Merriam's turkeys and other wild turkeys in California that demonstrate the aforementioned.

More recent literature, particularly addressing Merriam's turkeys, has demonstrated that they are probably more selective foragers than has been assumed. When food items eaten by wild turkeys were compared with food item availability in the environment, Rumble and Anderson (1996) concluded that contrary to the reported literature Merriam's turkeys were not opportunistic foragers, rather that they actually exhibited high selectivity for certain types of foods given seasonal availability (Hoffman et al. 1993, Rumble and Anderson 1996). Hurst (1992) concluded that, "A review of the literature, makes apparent that, from Maine to Mexico, in a variety of different habitats, all turkeys eat a great variety of foods, but from the same general types: hard and soft mast, green forage, seeds, agricultural crops, and animal matter."

## Plants

In a review of wild turkey food habits, Schorger (1966) said that, "The turkey consumes a great variety of animal and plant foods. By far, the greater part is from plants. Mast is consumed in the largest quantity when procurable, but some succulent plant material is essential. The food eaten depends largely on what is available." Plant materials consistently comprise the majority of the annual turkey diet throughout its range, with estimates as high as 95% of the total diet (Mosby and Handly 1943). Grasses and other green herbaceous plant leaves and seeds are the most utilized turkey foods throughout the year. Soft mast (fruits and berries) and hard mast (acorns

and pine seeds) is important fall and winter foods. To a lesser extent, roots and tubers may also be utilized.

### Animals

Invertebrates are the most reported animal foods consumed by wild turkeys. Insects are of particular importance to poults. Demands for protein are greatest during the first four weeks of life, and this demand continues through the juvenile stage to a lesser extent. During this time, insects also become widely available in the environment. Similar to plants, the most widely available invertebrates in the environment are generally consumed most. Major insects reported in the literature can be found in Appendix D. Vertebrates have rarely been reported in the literature, and mostly include amphibians and reptiles. As poults age, they shift food habits from animals to plants, which also reflects changes in availability of food items (Hurst and Stringer 1975, Healy 1985, Hurst 1992, Rumble and Anderson 1996).

### Agricultural Crops

Wild turkeys often utilize agricultural crops when available, such as corn, wheat, oats, alfalfa, nuts, and fruits (Hurst 1992). Corn and grain crops in the Midwest have an important role in supporting turkey populations (Little 1980). Turkeys are often attracted to agricultural and orchard areas for a variety of reasons, including water and insects, and for the crops themselves.

### Foraging Behavior

Wild turkeys feed almost exclusively from the ground or within the herbaceous vegetation layer. They do not usually feed in trees, except during periods of heavy snowfall when other food items are unavailable. Turkeys may wade into water to get

both plant and animal matter. Feeding behavior generally involves a combination of scratching at the ground and pecking at food items. Scratching behavior is most common when feeding for items on or beneath the surface of the ground, such as fallen mast and seeds or tubers, and is most prevalent during fall and winter. During spring and summer, turkeys tend to feed more in the herbaceous vegetation layer and will tend to pick or strip food items from vegetation (Hurst 1992). "Feeding movements are best described as nomadic within limits, seemingly aimless, yet purposeful in search for food" (Korschgen 1967). Turkeys tend to feed in flocks and rarely remain still, moving at an estimated 3.2 km (2 miles) an hour as measured in some studies (Mosby and Handley 1943, Lewis 1973). Turkeys may feed anytime of day, but generally have two periods where feeding is heaviest, in the morning after leaving the roost and in the late afternoon (Hurst 1992).

Hens with broods feed as a unit almost constantly. After poults reach one or two weeks of age, two or more successful hens often join together while feeding. Poults exhibit predatory feeding behavior early in life while feeding by pecking at food items that move away from them, mostly insects. They also exhibit behavior where they stalk, chase, jump, and tug at potential prey (Stringer 1977, Healy 1985). As they age, poults shift from exhibiting largely insectivorous to herbivorous behavior as their diet changes (Hurst 1992).

### California

Wild turkey food habits were studied in San Luis Obispo County in 1966 (Smith and Browning 1967). Wild turkey foraging ecology and food habits were studied in San Diego County during 1999 and 2000 (California Department of Fish and Game unpublished data). Appendix D contains a summary of these studies.

## WILD TURKEY POPULATIONS IN CALIFORNIA

### Historical Perspective

Although turkeys were native to the southwestern United States, including Mexico, Arizona, and New Mexico, they were not found in California at the time of European settlement (Burger 1954, Rea 1980). Prehistoric specimens of *Meleagris* spp. and *Parapavo* spp., which is considered a synonym of *Meleagris* spp. (Miller 1925), have been found primarily in southern California, including Los Angeles, Orange, and Santa Barbara counties (Steadman 1980). Numerous specimens from Rancho LaBrea suggest that these species were abundant in southern California during the late Pleistocene Epoch, but they went extinct about 10,000 to 12,000 years ago, presumably as the result of dramatic climatic change making the habitat no longer suitable. Additional limited specimens of *Meleagris* sp. have also been reported in Shasta County and other isolated areas of the northwest. However, the origin of these specimens remains unclear and prehistoric turkey distribution is not considered to extend into northern California (Rea 1980).

The first written record of modern wild turkey introduction into California was in 1877, when birds from Mexico were released on Santa Cruz Island (Caton 1877). From then until 1918, there are records of approximately 1,200 turkeys being released throughout the state, primarily from Mexican game farm stock (Schorger 1966). In 1928, the Department began a program of releasing turkeys that were propagated at Department game farms, from Mexican, Merriam's, and domestic stock. Under this program, about 3,350 hybrid turkeys, later referred to as "California hybrids," were released in 23 counties throughout the state (Burger 1954, Graves 1975). Only three populations were successfully established as a result of these stocking efforts, in San Luis Obispo, Sonoma, and Santa Clara counties (Burger 1954, Slossen et al. 1970).

Because of the poor success of game farm releases, the program was terminated in 1951.

By the early 1950's, domestically propagated birds were considered inferior for establishment in the wild, because they did not have the learned characteristics required to survive and reproduce. With the invention of techniques that allowed for the capture of large numbers of wild birds, translocation of wild stock was becoming popular to reestablish former populations and to establish new populations.

The first release of wild trapped stock in California occurred in 1949 and 1950, with Merriam's turkeys translocated from Arizona to Tulare County. In just two years, 23 translocated birds had grown to an estimated population of about 200 birds (Burger 1954). However, no known wild populations still exist from these releases. In 1959, the Department released the first Rio Grande turkeys in California. Sixty-two birds from Texas released in San Diego County were successful in establishing wild populations (Burger 1954).

Following these initial successes, the Department continued releasing wild-trapped turkeys from other states to establish wild California populations. Rio Grande turkeys were the most popular subspecies because they were more available than Merriam's stock and were highly successful in the seasonally-arid conditions of much of California's oak woodlands. Rio Grande turkey releases have been successful throughout the state, and The Rio Grande Turkeys are well established in most of the lower elevation oak woodlands statewide, and are very abundant in some areas. Rio Grande turkey populations have probably replaced most of the game farm birds that had historically become established along the central coast.

More recent efforts to establish turkeys in higher elevation coniferous habitats have been attempted with Merriam's turkeys. This subspecies is native to ponderosa

pine (*Pinus spp.*) dominated habitats of the southwest, including South Dakota, Colorado, and Arizona. Merriam's turkeys are thought to have originated from turkeys domesticated by native American cultures, which became feral as these civilizations broke down (Rea 1980). Merriam's turkeys have been released in the higher elevations of northern Coast Range, throughout northern California, the Sierra Nevada, and south to the San Bernardino Mountains, which have resulted in the establishment of local populations. However, many of these releases have not been successful, which may be attributable to numerous factors that are not clear, including habitat suitability, release methodology, and hunting pressure.

Eastern wild turkeys have been released in isolated locations along the northern coast, but no pure strains of eastern turkeys are considered established in California. Naturally occurring eastern-Rio Grande hybrids from Kansas have also been released in the state along with Rio Grande turkeys, and these have resulted in the expansion of ranges in San Diego County and along the northern coast.

Appendix E contains maps illustrating locations of wild turkey releases statewide during three periods: 1) The game farm era from 1928 - 1951; 2) the wild trapped era using mostly Rio Grande turkeys from 1959 - 1988; and 3) the wild trapped era from 1989 - present, with releases of Merriam's turkeys and Rio Grande turkeys statewide.

### **Current Range of Wild Turkeys in California**

Figure 3.2 illustrates Wildlife Habitat Relationships (Mayer and Laudenslayer 1988) habitat types that are potentially suitable for wild turkeys statewide. Rio Grande wild turkeys are currently well established in much of the lower elevation oak woodlands of the Sierra Nevada foothills and Coast Ranges, including the central coast, north coast through Mendocino County, and south coast in San Diego County. Rio Grande

turkeys are also established in the foothills of the Klamath and Cascade mountain ranges of northern California (Fig 3.2).

More recent efforts to establish wild turkey populations in higher elevation coniferous habitats with Merriam's turkeys have occurred throughout the state in potentially suitable habitat, including northern California, the Sierra Nevada, and San Bernardino Mountains. These efforts have resulted in the establishment of local populations in areas of the Tehachapi Mountains in Kern County, the San Bernardino National Forest, and isolated populations in northern California. The current extent of established Merriam's populations in northern California is not entirely clear, but they appear to be expanding. Merriam's turkeys are known to exist in the Warner Mountains of Modoc County, the vicinity of Horseshoe Ranch Wildlife Area and along the Klamath River in Siskiyou County, and in the higher elevations of the Tehama Wildlife Area and vicinity. No range for Merriam's turkeys is shown in Fig. 3.2 because the extent of their current range is unclear. The Department and the USFS are working to map the current range of turkeys in these higher elevation habitats.

In 1999, 424 Merriam's turkeys were released at 13 sites statewide, of which five of the proposed sites in this document are intended as augmentations (see Chapter 2). Populations have persisted in the vicinity of most of the release sites where they were released statewide, with the best apparent success in Plumas County, Lassen County, eastern Fresno County, and Tuolumne County. It is probably too soon following these releases to call them successes, although there have been reports of successful reproduction in each of these areas.

## **HABITAT CONDITIONS IN THE PROPOSED RANGE EXPANSION AREAS**

### **Habitat Suitability**

Figures 3.2 - 3.8 illustrate WHR habitat types suitable for wild turkeys at each of the seven sites proposed for range expansion. These vegetation types are mapped at a landscape scale and represent vegetation potentially capable of supporting wild turkey populations. However, these coverages do not represent all of the structural characteristics and successional state of the vegetation required to support a turkey population. Therefore, these maps represent maximum suitable habitat in a spatial (space) and temporal (time) sense. Actual suitable habitat at this time is smaller than represented in these maps.

Hardwood and mixed hardwood-conifer habitats are represented in shades of brown, while coniferous habitats are represented in shades of green. Merriam's turkeys are better suited for coniferous habitats, but may also occupy hardwood and mixed hardwood-coniferous habitats. Currently existing Rio Grande turkeys are unlikely to expand into coniferous dominated habitats in their own.

### **Sensitive Flora and Fauna Present in the Project Areas**

Information regarding sensitive flora and fauna potentially present in the project areas surrounding each of the 7 release sites proposed for range expansion were gathered from existing databases available to the Department (see below). A radius of 25 miles surrounding each of the release sites was selected as the project area for querying data regarding sensitive species. This distance was selected as a practical distance, although wild turkeys may certainly disperse outside these areas, 25 miles was about the extent of movements found in previous releases. Furthermore, in many cases, wild turkey populations are already established outside these boundaries.

Scoping comments suggested that survey work should be conducted in each of the project areas for sensitive species. Such surveys were considered impractical largely because of the size of the project area when compared with the scale at which such survey work must be conducted. The inability to clearly define the areas that wild turkeys would eventually inhabit also rendered complete surveys impractical. Therefore, existing information regarding sensitive species potentially present was preferred. A conservative approach was taken when gathering this data, in that if there were any historic records of a particular species in the project area, that species was assumed to be present unless it was known to now be extinct. All sensitive species in the project areas were also included, whether or not they occupied habitat that wild turkeys were likely to occupy.

All records of sensitive flora and fauna documented at least partially within the 25-mile project areas surrounding each release site were gathered from the California Natural Diversity Data Base (CNDDB; California Department of Fish and Game, California Natural Diversity Data Base 2001a, 2001b). Additionally, all available records of sensitive flora found in 1:24,000 USGS quadrangles that were at least partially within the 25-mile project areas were gathered from the California Native Plant Society's (CNPS) Electronic Inventory, version 1.5.2 (California Native Plant Society 1994, 2000). Master summary tables of the results of these searches for all 7 proposed release sites are presented in tables 3.1 (plants) and 3.2 (animals). For the purposes of this document, sensitive species included those species contained in the aforementioned databases, all of which fit the definition of endangered, threatened, or rare as defined in CEQA Section 15380. Sensitive species include the following categories: 1) Plants and animals listed as threatened, endangered, or candidates under the Federal Endangered Species Act (FESA) and/or California Endangered Species Act (CESA), 2) Plants listed by the California Native Plant Society, 2) Plants and animals listed as California Species of Special Concern by the Department, and 3) Animals listed as fully-protected

in Fish and Game Code Sections 3511 (birds), 4700 (mammals), and 5050 (reptiles and amphibians).

The analysis of potential impacts of the proposed project to these species are presented in Chapter 4: Analysis of Potential Impacts to Sensitive Species. Additional information regarding the known extant distribution of each of the plants listed in Table 3.1 are included in Appendix F: Extant Distribution of Sensitive Flora.

Basic information regarding biology and ecology of each of the sensitive species potentially present in the composite project areas is presented in tables 3.1 and 3.2. All known records of occurrences from the CNDDDB were gathered for each plant at each proposed release site, and the number of occurrences are summarized in Table 3.1. Information available in the CNPS Electronic Inventory does not indicate number of occurrences. Therefore, plants containing a specific number of CNDDDB occurrences may be included in both databases, but plants with no designated number of occurrences are included only in the CNPS database.